



Application Serial No.: 09/988,136
Reply to Office Action dated July 31, 2006

LISTING OF CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Claims 1-17 (Canceled).

18. (Currently Amended) A product manufacturing ~~cost-estimation~~ man-hour estimating apparatus comprising:

~~a three-dimensional CAD unit that creates three-dimensional CAD model data of a product and adds attribute information to the three-dimensional CAD model data;~~

~~a product manufacturing cost-estimation device that is connected to the three-dimensional CAD unit;~~

~~wherein the product manufacturing cost-estimation device includes:~~

~~an estimation element database which stores necessary estimation elements necessary for estimating of manufacturing cost~~ estimation of the product;

~~a manufacturing process design reference database which stores reference data setting a manufacturing process of the product;~~

~~an estimation reference database which stores both (i) an estimation formula to calculate a cost physical unit value~~ man-hour in the manufacturing process by substituting the estimation elements and (ii) a physical unit table indicating each value of the estimation elements as a ~~cost~~ physical unit value;

an estimation-element-extracting section which (i) is connected to a three-dimensional CAD creating three-dimensional CAD model data on the product and adding attribute information including the estimation elements to the three-dimensional CAD model data, (ii) receives the three-dimensional CAD model data from the three-dimensional CAD, and (iii) extracts the estimation elements from the attribute information-added to the three-dimensional CAD model data;

a manufacturing process setting section which sets the manufacturing process by searching the reference data for setting the manufacturing process stored in the manufacturing process design reference database, based on the estimation elements extracted by the estimation-element-extracting-section; and

~~a cost physical unit value estimation section which obtains the cost physical unit value of the manufacturing process set by the manufacturing process setting section by calculating the estimation formula stored in the manufacturing process design reference database;~~

~~the cost physical unit value~~ an estimation section including a program memory in which an estimation program is stored beforehand, the estimation program (i) auto[[-]]creating section which automatically converts a format of the estimation formula;

~~the program auto-creating section including:~~

~~a first source program creating section which creates a first source program configured to extract the estimation elements from the estimation formula stored in the estimation reference database, and convert the extracted estimation elements into a format including an identifier and names of the estimation elements by searching the estimation~~

~~element database[[;]] and an identifier, (ii) creating the [[a]] second source program creating section which creates a second source program configured to extract the estimation elements from the estimation formula, convert the estimation elements the source program creating section and used to obtain a physical unit value from a physical unit table into the format including the names of the estimation elements and the identifier, and extract the physical unit value corresponding to the names of estimation elements which can be executed by the programming rule, and the identifier from the physical unit table, and (iii) converting the estimation formula into the format including the names of estimation elements and the identifier by executing the first and second source programs; and~~

~~a third source program creating section which executes the first and second source programs created in the first and second source program creating sections, and converts the estimation formula into the format including the names of the estimation elements and the identifier,~~

~~the cost physical unit a man-hour estimation section which (i) creates a first source program configured to execute the estimation program stored in the estimation program memory, extract the estimation elements from the estimation formula stored in the estimation reference database, and convert the estimation elements into the format including the names of the estimation elements and the identifier, (ii) creates a second source program configured to extract the estimation elements from the estimation formula, convert the estimation elements into the format including the names of the estimation elements and the identifier, and extract the physical unit value corresponding to the names of the estimation elements and the identifier from the physical unit table, (iii) converts the estimation elements into the~~

format including the names of the estimation elements and the identifier by executing the first and second source programs, and (iv) calculates the man-hour in the manufacturing process setting section, calculating the cost physical unit value by substituting the cost physical unit value for in the converted estimation formula converted in the third source program creating section.

Claim 19 (Canceled).

20. (Currently Amended) The A product manufacturing ~~cost~~ man-hour-estimation apparatus according to claim 18, wherein:

~~in a bending process, the estimation formula includes bending treatment time, a number of occasions and mold changing unit time;~~

~~the bending treatment time~~ an estimation element database which stores data on a component including at least plate thickness, length and width, bending-treatment time, a number of occasions of the bending treatment, and mold-changing unit time as estimation elements necessary for manufacturing estimation of the product;

a manufacturing process design reference database which stores reference data setting a manufacturing process of the product;

an estimation reference database which stores (i) an estimation formula which has bending-treatment time the mold-changing unit time includes including the plate thickness, the length and the width, number of occasions and the mold-changing unit time including the plate thickness, the length and the width and calculates a man-hour in the manufacturing

process substituting the bending-treatment time, the number of occasions and the mold-changing unit time, and (ii) stores a the physical unit table stores indicating each value of the plate thickness, the length and the width as physical unit value;

~~the first source program creating section creates the first source program configured to extract the plate thickness, the length, the width, the number of occasions and the mold-changing unit time from the estimation formula, converts the plate thickness, the length, the width, the number of occasions and the mold-changing unit time into formats each of which includes the names of estimation elements and the identifier;~~

~~the second source program creating section creates the second source program configured to convert the plate thickness, length and width of the mold-changing unit time corresponding to the plate thickness, length and width of the physical unit table included in the estimation formula into the formats each of which includes the names of estimation elements and the identifier; and~~

~~the third source program creating section executes the first and second source programs created in the first and second source program creating sections, and converts the estimation formula including the names of estimation elements of the bending-treatment time, the number of occasions and the mold-changing unit time and the identifier~~

an estimation-element-extracting section which (i) is connected to a three-dimensional CAD creating three-dimensional CAD model data on the product and adding attribute information including the estimation elements to the three-dimensional CAD model data, (ii) receives the three-dimensional CAD model data from the three-dimensional CAD, and (iii) extracts the estimation elements from the attribute information;

a manufacturing process setting section which sets the manufacturing process by searching the reference data for setting the manufacturing process stored in the manufacturing process design reference database, based on the estimation elements extracted by the estimation-element-extracting-section;

an estimation program memory in which an estimation program is stored
beforehand, the estimation program (i) creating the first source program configured to extract the plate thickness, the length, the width, the number of occasions and the mold-changing unit time from the estimation formula stored in the estimation reference database and convert the plate thickness, the length, the width, the number of occasions and the mold-changing unit time into formats each of which includes the names of estimation elements and the identifier, (ii) creating the second source program configured to convert the plate thickness, length and width of the mold-changing unit time corresponding to the plate thickness length and width of the physical unit table included in the estimation formula into the formats each of which includes the names of estimation elements and the identifier, and (iii) converting the estimation formula into the format including the names of estimation elements of the bending-treatment time, the number of occasions and the mold-changing unit time and the identifier by executing the first and the second source program; and

a man-hour-estimating section which (i) creates a first source program configured to execute the estimation program stored in the estimation program memory, extract the plate thickness, the length, the width, the number of occasions and the mold-changing unit time from the estimation formula stored in the estimation reference database, and convert the plate thickness, the length, the width, the number of occasions and the mold-changing unit time

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into the formats each of which includes the names of estimation elements and the identifier, (ii) creates the second source program configured to convert the plate thickness, length and width of the physical unit table included in the estimation formula into the formats each of which includes the names of estimation elements and the identifier, (iii) converts the estimation formula into the format including the names of estimation elements of the bending-treatment time, the number of occasions and the mold-changing unit time and the identifier by executing the first and the second source program, and (iv) calculates the man-hour in the manufacturing process set by the manufacturing process setting section, by substituting the physical unit value in the converted estimation formula.